

Appendices to

**China's Reform Period Economic Growth:
How Reliable Are Angus Maddison's Estimates?**

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1. Appendix on Shares of Tertiary Sector Subsectors in China's GDP

Table 1. Shares of Tertiary Sector Subsectors in GDP (in %)

	1987		1978		1995		Reference (NBS)	
	A.M.	NBS	A.M.	NBS	A.M.	NBS	1990	2000
<i>Pre-1991 classification</i>								
Tertiary total	31.13	29.31	28.23	23.74	29.91	30.69	31.34	
1. Transport and communication	4.13	4.56	3.54	4.77	5.22	5.22	6.19	
2. Commerce and restaurants	8.79	9.69	5.00	7.33	7.29	8.43	7.65	
3. "Other services"	18.22	15.07	19.69	11.65	17.40	17.03	17.50	
(i) Social services		2.25		1.82		3.06	2.18	
(ii) Public utilities		0.41		0.48		0.43	0.37	
(iii) Banking and insurance		4.49		2.15		5.96	6.66	
(iv) Real estate		1.66		1.35		1.81	1.75	
(v) Science, education, culture, health, sports, and welfare		3.07		2.62		3.00	3.31	
(vi) Government, Party, social organizations, and others		3.17		3.23		2.77	3.23	
<i>Post-1989 classification</i>								
Tertiary total						30.69	31.34	33.42
1. Farming, forestry, animal husbandry and fishery						0.20	0.24	0.26
2. Geological prospecting and water conservancy						0.43	0.35	0.37
3. Transport, storage, post, and telecommunications						5.22	6.19	6.05
(i) Transport and storage						4.07	5.60	3.82
(ii) Post and telecommunication						1.16	0.59	2.23
4. Wholesale and retail trade and catering services						8.43	7.65	8.18
5. Banking and insurance						5.96	6.66	5.83
6. Real estate						1.81	1.75	1.89
7. Social services						2.64	1.77	3.63
8. Health care, sports, soc. welf.						0.83	0.94	0.92
9. Education, culture, arts, radio, film, and television						1.92	2.12	2.67
10. Scientific research and polytechnical services						0.47	0.44	0.70
11. Government, parties, and social organizations						2.46	2.94	2.62
12. Others						0.31	0.29	0.31
<i>Aggregated</i>								
Repeat: transport, storage, post, and telecommunications	4.13	4.56	3.54	4.77	5.22	5.22	6.19	6.05
Repeat: wholesale and retail trade and catering services	8.79	9.69	5.00	7.33	7.29	8.43	7.65	8.18
"Other services" (repeat, or sum of all else)	18.22	15.07	19.69	11.65	17.40	17.03	17.50	19.20

A.M.: Angus Maddison NBS: National Bureau of Statistics (official data)

Sources: Angus Maddison's data are from Angus Maddison (1998), Table C.3 (p. 157). NBS data for 1978 through 1995 following the old classification are from *GDP 1952-95*, pp. 27f.; and for 1990 through 2000 following the new classification from the *Statistical Yearbook 1998*, pp. 55, 59 (for 1990 and 1995) and 2003, pp. 55, 59 (for 2000).

2. Appendix on Employment in “Other Services”

For 1991 and 1992, the tertiary sector census of 1992 provides employment data on the tertiary sector, including “other services.” According to the *Tertiary Sector Census 1992*, pp. 14-25, employment in “other services” in 1992 was 85.154m. For 1992, Angus Maddison reports (official) employment in “other services” of 67.175m (Table D.3, p. 171), including the presumably double-counted 3m military personnel. AM, thus, underestimates employment in “other services” in 1992 by 21.11% (or by 24.64% if he double-counts military personnel). The 1992 tertiary sector census was the first of its kind in China and similar census data for an earlier year are not available.

The employment value from the tertiary sector census is obtained as follows. The census reports employment for two groups of statistical units, ‘enterprises and administrative units,’ and ‘individual-owned economy.’ Total employment in the first group in 1992 is 114,823,924, from which I subtracted geological prospecting and water conservancy 1,491,742, transport and communication 10,156,505, and commerce and catering 22,575,980; total employment in the second group in 1992 is 27,361,442, from which I subtracted transport and communication 4,779,774, commerce 13,345,011, and catering 4,682,832, with the category geological prospecting and water conservancy not listed under the second group.

Three conjectures as to the coverage of the residual labor category in 1995 are: (i) migrant laborers, especially those not employed by formally registered institutions, for example, maids employed by urban households; (ii) furloughed laborers in unregistered self-employment; (iii) employees of government and administrative units who are not part of the official, authorized staff (*bianzhi*). A series of administrative reforms forced government and administrative units at all levels to reduce the number of their staff, which, however, all too often only meant the creation of unofficial positions or positions in subordinate or affiliated units; data on the number of these employees is possibly not available to the statistical authority. If the employment categories “government” and “science” (research, education/ media, health/ welfare) reflect only official, authorized staff, the government and science categories underreport actual employment. In at least the first and third case, “other services” would likely be the appropriate employment category.

Separately, Thomas Rawski and Robert Mead (1998) identify 100m “phantom farmers” in the form of laborers reported in the official statistics as farmers but not actually working as farmers (not related to the implicit residual laborers). They speculate that these phantom farmers work in construction, transport, and trade; they do not mention “other services.”

References specific to this appendix:

Rawski, Thomas G., and Robert W. Mead. “On the Trail of China’s Phantom Farmers.” *World Development* 26, no. 5 (May 1998): 767-81.

Tertiary Sector Census 1992. Zhongguo shouci di san chanye pucha ziliao: 1991-1992 (Materials on China’s first tertiary sector census: 1991-1992). Beijing: Zhongguo tongji chubanshe, 1995.

3. Appendix on Average Annual Real Growth of Labor Productivity in the OECD National Accounts Database

Table 2 reports average annual labor productivity growth (in real terms) for those OECD countries for which value added data at constant prices as well as employment data are available in the OECD's National Accounts (rather than Services) database. Across all countries, labor productivity growth in the service sector trade and transportation is positive in all of the last three decades, in the Chinese reform period years 1978-95 covered by Angus Maddison, and in 1970-2003 for those countries which report data for both the first and the last year in the database. Growth rates vary from a decade-low of (average annual) 0.49% to a decade-high of 4.47%. In contrast, in the other two service sectors, finance & real estate and the residual "other" services, growth rates are often negative and tend to be around zero, with a decade-low of -1.84% in the case of finance combined with a decade-high of 1.76%, and a range from -0.65% to 1.19% in the case of "other services."

Yet, even in this dataset, some countries exhibit consistently positive labor productivity growth rates in non-trade non-transportation services. In the case of finance, the two cases are Austria and Canada, with decade labor productivity growth rates in Austria in finance even similar to those in trade. In the case of "other services," France, Iceland, Norway, and Spain all exhibit consistently non-negative decade labor productivity growth rates in "other services," albeit always at a level below the labor productivity growth rates in trade and transportation.

Table 2. Average Annual Real Growth of Labor Productivity (in %), OECD National Accounts Database

	<i>Value added</i>					<i>Agriculture</i>				
	<i>1970-1980</i>	<i>1980-1990</i>	<i>1990-2000</i>	<i>1978-1995</i>	<i>1970-2003</i>	<i>1970-1980</i>	<i>1980-1990</i>	<i>1990-2000</i>	<i>1978-1995</i>	<i>1970-2003</i>
Austria		2.51	2.16	2.55			4.54	6.65	6.07	
Canada			1.56					1.95		
France		2.42	1.35	2.17			5.24	4.44	5.45	
Iceland		1.53		1.38			1.68		1.91	
Italy	2.40	1.71	1.60	1.77	1.71	3.09	3.00	6.06	4.54	3.52
Korea			4.21					5.70		
Netherl.	2.94	1.61	1.13	1.42		6.80	4.76	2.78	4.74	
Norway	3.40	2.18	2.59	2.64	2.62	3.62	3.75	5.59	4.91	4.09
Spain		1.95	0.84				5.85	4.80		
U.S.	0.51	1.06	1.80	0.80		-0.46	4.52	7.97	2.13	
	<i>Industry</i>					<i>Construction</i>				
	<i>1970-1980</i>	<i>1980-1990</i>	<i>1990-2000</i>	<i>1978-1995</i>	<i>1970-2003</i>	<i>1970-1980</i>	<i>1980-1990</i>	<i>1990-2000</i>	<i>1978-1995</i>	<i>1970-2003</i>
Austria		3.76	4.18	3.82			1.42	2.18	1.54	
Canada			2.33					1.05		
France		3.26	3.78	3.52			2.39	0.13	1.66	
Iceland		1.52		2.00			1.30		1.50	
Italy	2.31	2.75	2.12	2.46	2.14	1.88	1.86	-0.06	0.98	1.05
Korea			9.65					0.89		

Netherl.	5.13	2.32	2.63	2.73		-0.03	2.44	-0.70	0.68		
Norway	6.17	5.56	3.70	5.65	4.89	1.79	1.94	1.06	2.17	1.26	
Spain		2.69	1.85				1.98	-0.19			
U.S.	1.03	2.96	4.41	2.42		-3.01	-0.19	-0.21	-0.58		
	<i>Trade and transportation</i>					<i>Finance, real estate</i>					
	<i>1970-</i>	<i>1980-</i>	<i>1990-</i>	<i>1978-</i>	<i>1970-</i>	<i>1970-</i>	<i>1980-</i>	<i>1990-</i>	<i>1978-</i>	<i>1970-</i>	
	<i>1980</i>	<i>1990</i>	<i>2000</i>	<i>1995</i>	<i>2003</i>	<i>1980</i>	<i>1990</i>	<i>2000</i>	<i>1995</i>	<i>2003</i>	
Austria		2.32	1.53	2.23			1.76	1.47	1.73		
Canada			2.37					0.51			
France		2.96	1.63	2.47			0.51	-0.69	0.51		
Iceland		2.06		1.35			-1.01		-0.46		
Italy	2.37	0.89	2.00	1.72	1.58	-0.19	-2.21	-0.60	-1.61	-1.06	
Korea			2.93					-1.12			
Netherl.	2.94	1.88	2.14	1.35				-0.54			
Norway	4.36	2.08	4.47	2.98	3.61	-0.38	-1.61	-0.35	-0.71	-0.50	
Spain		0.49	0.57				0.51	-1.84			
U.S.	0.89	2.35	3.45	1.75		-0.33	-1.49	-0.19	-0.83		
	<i>Other services</i>					<i>Percentage share in 1978 value added</i>					
	<i>1970-</i>	<i>1980-</i>	<i>1990-</i>	<i>1978-</i>	<i>1970-</i>	<i>Agri-</i>	<i>Ind-</i>	<i>Con-</i>	<i>Tra-</i>	<i>Fin-</i>	<i>Other</i>
	<i>1980</i>	<i>1990</i>	<i>2000</i>	<i>1995</i>	<i>2003</i>	<i>cult.</i>	<i>ustry</i>	<i>struc.</i>	<i>de</i>	<i>ance</i>	<i>serv.</i>
Austria		-0.02	-0.65	0.15		2.5	23.6	9.7	22.4	16.6	25.2
Canada			-0.36			3.2	29.6	6.9	17.8	20.3	24.0
France		0.87	0.34	0.63		3.0	21.6	8.2	16.1	26.2	24.0
Iceland		1.19		0.80		14.6	20.6	10.0	21.8	15.0	19.4
Italy	0.65	-0.37	0.47	0.00	0.27	3.6	26.6	6.4	21.2	20.2	21.6
Korea			-0.26			13.7	20.9	10.5	16.1	13.7	26.0
Netherl.			0.10			2.2	23.6	9.2	18.5	18.2	28.8
Norway	0.00	0.15	0.67	0.29	0.31	3.1	32.1	6.9	16.1	17.8	23.9
Spain		0.18	0.48			4.2	22.4	8.9	29.6	17.5	16.7
U.S.	0.29	-0.25	-0.38	-0.36		1.3	22.3	6.5	16.8	24.5	28.7

Value added: Value added at basic prices

Agriculture: Agriculture, hunting and forestry; fishing

Industry: Industry (including energy)

Construction: Construction

Trade and transportation: Wholesale and retail trade, repairs; hotels and restaurants; transport

Finance: Financial intermediation; real estate, renting and business activities

Other services: Other service activities

Labor productivity is calculated from value added (in constant/ basic prices) and employment data.

Either no output or no employment data are available for Australia, Belgium, Czech Republic, Denmark, Finland, Germany, Greece, Hungary, Ireland, Japan, Luxembourg, Mexico, New Zealand, Poland, Portugal, Slovakia, Sweden, Switzerland, Turkey, and the United Kingdom.

Value added at basic prices in total and for each sector is at constant year 2000 prices. Value added at basic prices across sectors does not perfectly add up across sectors to the total; the sum across the countries (listed in the order as in the table) is 100.0%, 101.8%, 99.2%, 101.4%, 99.7%, 101.0%, 100.5%, 99.9%, 99.4%, 100.1%.

Employment data are total employment, full-time equivalent.

The maximum time period for which data are potentially available in the source is 1970 through 2003.

Sources:

<http://www.sourceoecd.org> (National Accounts database with “volume 1 – Main aggregates *Vol 2004 release 03*” and “volume 1 – Population and Employment *Vol 2004 release 03*”). Accessed on 26 Sept. 04.

4. Appendix on Average Annual Real Growth of Labor Productivity in Services in the OECD Services Database, ISIC Rev. 2

Table 3 reports average annual labor productivity growth rates calculated from the OECD Services database according to the earlier ISIC classification scheme, Rev. 2, with six second-level service subsectors, for all OECD countries for which labor productivity data could be calculated within this scheme. The finance sector again fares exceedingly well, especially in the earliest years for which the data are available, with an average annual labor productivity growth rate in Belgium of 6.41% in 1975-80 and in Luxembourg of 17.96% in 1970-75. Social services perform well in France (better than trade) while government services perform well in Portugal (again, better than trade). The residual sector “others” fares well in Sweden (similar to trade). These data suggest that even in OECD countries, labor productivity in non-trade non-transportation services can rise significantly over time.

Table 3. Average Annual Real Growth of Labor Productivity in Services (in %), OECD Services Database, ISIC Rev. 2

	1970-75	1975-80	1980-85	1985-90	1990-95	Maximum period	
						[1]	[2]
Belgium						1970-74	1975-96
Trade		0.55	-0.65	0.49	1.80	2.34	0.57
Transportation		2.28	2.95	4.00	1.78	1.86	2.57
Finance		6.41	1.35	3.50	7.01	5.26	4.70
Social		1.58	0.28	-0.60	-0.26	0.86	0.12
Government		-0.17	0.15	0.14	2.60	3.28	0.78
Others		1.73	0.14	0.82	0.04	-0.80	0.61
Total		1.36	0.41	1.01	1.55	2.34	1.03
France	[1]					1970-76	1977-97
Trade			1.77	1.27	0.23		0.89
Transportation	4.38		2.10	5.52	2.56	4.18	3.63
Finance			0.28	-0.86	0.57		-0.08
Social			2.19	1.79	0.59		1.33
Government			0.04	0.66	0.09		0.52
Others							
Total	2.51		0.94	1.57	0.78	2.20	1.10
Iceland		[1]	[1]			1973-89	1990-96
Trade		2.09	-1.53		-0.32	0.50	0.30
Transportation		3.79	3.04		2.29	3.17	3.33
Finance		0.16	-1.59		0.35	-0.72	0.63
Social		3.40	3.97		0.71	2.98	1.33
Government		-0.22	1.07		0.90	1.38	0.81
Others		0.09	-2.12		-0.48	-0.82	-0.37
Total		1.54	0.33		0.59	1.08	1.05
Luxembourg						1970-91	
Trade		3.25	0.77	3.97			
Transportation	4.09	2.92	3.98	2.26		3.06	
Finance	17.96	7.57	-3.90	1.69		5.15	
Social		-4.50	-0.88	-2.30			
Government	-1.25	0.24	0.88	-0.35		-0.03	

Others	-0.46	0.17	-7.49	1.83	-1.41
Total	0.30	0.41	0.15	0.91	0.34
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Norway					1970-75 1976-78
Trade					3.58 0.45
Transportation					4.19 -0.79
Finance					-1.84 -0.28
Social					0.87 0.74
Government					0.70 -0.06
Others					
Total					1.74 -0.15
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Portugal					1977-95
Trade			-0.25	0.38	1.33 0.51
Transportation			4.37	4.83	6.64 5.55
Finance			-1.12	5.66	-3.12 0.07
Social			-1.72	2.48	-4.61 -1.73
Government			1.63	1.46	0.86 1.59
Others					
Total			0.36	1.89	0.75 1.03
<hr/>					
Spain					1980-94
Trade			2.34	-0.80	0.80
Transportation			2.83	3.42	3.20
Finance			1.86	-1.26	-0.46
Social			0.47	-0.75	-0.26
Government			0.37	0.35	0.97 0.55
Others					-0.10
Total			1.46	-0.39	0.68
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Sweden					1980-96
Trade			1.20	2.17	3.23 2.27
Transportation			0.33	5.64	2.26 2.76
Finance			-0.02	-3.13	2.27 -0.31
Social			0.43	0.15	-0.10 0.36
Government			-0.03	1.01	1.08 0.68
Others			0.49	5.13	2.26 2.22
Total			0.56	1.33	2.16 1.38

[1], [2]: The maximum time period covered by the database is 1970-1999. For some countries, data are available for two or three sub-periods, separately. Whenever two adjacent sub-periods have one year of overlap, the two time series were combined. In some cases, sub-periods were mutually exclusive; the maximum number of mutually exclusive sub-periods per country was two. In the table, the first mutually exclusive sub-period is marked with “[1];” all other data for that country then are for sub-period [2].

The abbreviated labels stand for:

Trade: Wholesale and retail trade, restaurants and hotels

Transportation: Transport, storage and communication

Finance: Finance, insurance, real estate and business services

Social: Community, social and personal services

Government: Producers of government services

Others: nec, other producers

Labor productivity is calculated from value added (in constant prices) and employment data. The source does not specify whether employment data cover persons or full-time equivalents. The base year for value added in constant prices is also not specified.

Sources: <http://www.sourceoecd.org> (Services database, with “Value Added and Employment ISIC Rev. 2 Total Employment – Historical Series Vol 2001 release 01” and “Value Added and Employment ISIC Rev. 2 – Value Added Volumes – Historical Series Vol 2001 release 01”). Accessed on 30 Sept. 04.

5. Appendix on U.S. Labor Productivity Growth in Services

In the case of the U.S., constant-price value added can be approximated by the available data on wages and salaries, deflated by the urban CPI. Due to the labor intensity of most services, wages and salaries are likely to account for more than three quarters of value added.¹ Table 4 reports the data. In the two subsectors where Angus Maddison accepts the official Chinese real growth rates, namely in transportation and communication, and in commerce, growth rates in the U.S. tend to be highest in the early decades, especially in 1950-60.

An average annual growth rate of labor productivity (*real* labor productivity, same below) in each of the two subsectors transportation and communication (the U.S. data offer an aggregate value only for transportation, communication, *and* public utilities), of about 2.61% and 1.89% in 1950-60—but then on average approximately no growth between 1960 and 2000—contrasts with a corresponding Chinese growth rate of 3.98% in the period 1978-95.² An average growth rate of labor productivity in commerce in the U.S. of about 3% in 1950-60, but then negative 2% in 1980-90, contrasts with the corresponding Chinese growth rate of 1.66% in the period 1978-95. In other words, for these two subsectors for which Angus Maddison accepts that Chinese average annual labor productivity growth rates in 1978 through 1995, Chinese labor productivity growth rates are very close to the U.S. average annual real growth rates in the early years, and, in the case of transportation and communication, more than three percentage points higher than the U.S. growth rates of the 1970s through 2000.

Angus Maddison assumes zero labor productivity growth for “other services” in China, even though the pattern for the U.S. in the case of “other services” is little different from that in the case of transportation & communication, and commerce, with growth rates in finance, insurance and real estate in the 1950s of 3.53% and in (other) “services” of 1.93%. These growth rates compare to labor productivity growth in China’s “other services” between 1978 and 1995 of 4.73%.

At the very least, the U.S. data suggest that Angus Maddison’s treatment of the three subsectors of services in China is inconsistent with U.S. patterns of labor productivity growth across the three subsectors.

¹ Value added of “other services” in the national accounts is usually derived based on the income approach, in which wages and salaries dominate. Multiplying the number of full-time equivalent employees by the wage and salary accruals per full time equivalent employee in each of the sectors identified as a service sector (and therefore included in Table 4) yields total wage and salary payments in aggregate non-government services of 2897.7b USD in 2000. Since government value added in the Bureau of Economic Analysis tables is not broken down into goods vs. services, the government is not considered here. In comparison, the value of total personal consumption services in the National Income and Product Accounts is 3928.8b USD. The two data points are not fully comparable since the National Income and Product Accounts also comprise housing services of 1006.5b USD. (The data are from various tables on the BEA website at <http://www.bea.doc.gov/>.)

The U.S. data offer a valid comparison if (i) the share of wages and salaries in (the unknown) value added is constant over time, (ii) the CPI is an appropriate deflator, and (iii) the omission of the government has an identical impact on all subsectors of “other services.”

² Labor productivity growth in the case of China was obtained by removing the employment growth component from the overall real growth in value added of the specific sector. For details see the notes to Table 4.

Table 4. U.S. Labor Productivity Growth in Services: Average Annual Real Growth in Wages and Salaries Per End-Year Full-time Equivalent Employee (in %)

	1950-60	1960-70	1970-80	1980-90	1990-00	1978-95
Transportation and public utilities	2.86	1.44	0.71	0.72	0.51	
Transportation	2.61	1.00	-0.98	0.54	1.28	
Communication	1.89	0.90	-0.92	-1.99	0.26	
Electric, gas, and sanitary services	3.30	2.84	0.05	-2.11	0.12	
Compare China: transport (& communication)						
labor productivity <i>and</i> employment growth						9.97
only labor productivity growth						3.98
Wholesale trade	2.70	1.67	1.39	1.05	0.90	
Retail trade	3.40	1.56	-0.87	0.26	1.18	
Compare China: commerce (& catering)						
labor productivity <i>and</i> employment growth						9.90
only labor productivity growth						1.66
Finance, insurance, and real estate	3.53	1.90	1.78	0.98	2.30	
Services	1.93	1.14	-0.62	3.63	2.46	
Compare China: “other services” (using Angus Maddison’s mid-year employment data)						
labor productivity <i>and</i> employment growth						11.76
only labor productivity growth						4.73

Sources:

U.S. data on wages and salaries are from <http://www.bea.doc.gov/bea/dn/nipaweb/>. The nominal data were deflated using the urban CPI (the only CPI available) from <http://www.bls.gov/cpi/>. Chinese “labor productivity and employment growth data” are from Angus Maddison (1998), Table C.6, p. 160, where he reports both his own volume estimates as well as the official data; the two sources are identical for transport and commerce (except for a small typo in copying his own data from Table C.3 to Table C.6 in the case of commerce). Angus Maddison accepts the official Chinese growth rates (as reported in the table here) for transport as well as for commerce, but not for “other services,” where his data reflect solely employment growth.

Labor productivity growth in China in transport and commerce were obtained by removing the growth in the number of employees from real growth in value added (i.e., from the aggregate labor productivity and employment growth). Angus Maddison provides employment data only for “productive services” in total, i.e., for the sum of transport and communication and commerce (Table D.3, p. 171). Trying to reconstruct Angus Maddison’s employment data reveals a statistical break (apparently unnoticed by Angus Maddison) between 1977 and 1978, which it would be possible to bridge approximately (see article for more details). I use end-year employment data for transport and commerce instead, as in the case of the U.S. data throughout.

To calculate labor productivity growth in “other services” I use Angus Maddison’s average annual growth rate of employment and the official average annual growth rate of value added of “other services” (Table C.6, p. 160). Angus Maddison’s real growth rate in the value added of “other services” of 6.71% reflects only employment growth (the employment data reported by Angus Maddison in his Table D.3, p. 171, would have implied a 6.7151%, i.e., 6.72% growth rate). A 6.71% growth rate (in employment) times a 4.73% growth rate in labor productivity equals the 11.76 growth rate in value added ($1.0671 \times 1.0473 = 1.1176$). Year-end employment data (from the *Statistical Yearbook 2003*, pp. 128f.) for “other services” implies an employment growth rate of 6.55% or, if geological prospecting and water conservancy employment is excluded as is Angus Maddison’s practice, of 6.84%; the corresponding growth rates in labor productivity are 4.89% and 4.61% (compared to the 4.73% reported in the table).

6. Appendix on Average Annual Real Growth of Labor Productivity in Taiwan ROC

Data on Taiwan ROC are available for the years since 1972. Table 5 has the labor productivity growth rates. Between 1972 and 1980, labor productivity in a comprehensive category government services rose 1.78% per year, and in finance, insurance, and business services 3.64%; for the period 1980-90 the two rates are 2.27% and 1.70%, and in 1990-2000 1.69% and 0.58%. Labor productivity growth rates across all periods are positive (not zero), and range from a small fraction to two-thirds of China's average annual labor productivity growth rate in 1978-95.

Table 5. Average Annual Real Growth Rate of Labor Productivity (in %), Taiwan ROC

	1972-2001	1972-1980	1980-1990	1990-2000	1978-1995
Total	4.97	5.18	5.41	4.98	5.33
Agriculture	3.95	5.17	3.60	3.50	4.29
Industry	4.20	3.50	4.88	4.68	4.56
Manufacturing	4.48	3.51	5.20	5.36	5.34
Construction	4.02	9.89	1.61	3.40	4.15
Electricity, gas, water	4.62	1.98	6.55	4.08	3.34
Services	4.21	4.03	4.83	4.35	4.50
Commerce	4.25	3.40	4.61	5.28	4.78
Transport, storage, communication	7.34	10.34	5.39	7.49	5.52
Government services	1.84	1.78	2.27	1.69	2.04
Finance, insurance, bus. services	1.69	3.64	1.70	0.58	1.89

Industry, apart from the listed sub-industries, includes mining and quarrying. Government services consist of (i) social and personal services and (ii) public administration. Finance, insurance, and business services consists of (i) finance, insurance and real estate, and (ii) business services. Employment data would have been available for these various categories, but not (constant-price) value added.

Labor productivity is calculated from "GDP composition" data (in year 1996 NT\$ prices) and the number of average annual employed persons (total employment). The maximum time period for which data are potentially available in the set of the two sources is 1972 through 2001.

Sources:

Employment: *Statistical Yearbook of Taiwan 2002*, and *2003*, online at <http://www.dgbas.gov.tw/english/dgbas-e0.htm>; constant-price value added: online at <http://www.stat.gov.tw/bs4/nis/enisd.htm>. Both websites were accessed on 30 Sept. 04.

7. Appendix on Average Annual Labor Productivity Growth across Countries Worldwide (ISIC, Rev. 2)

Table 6. Average Annual Labor Productivity Growth, Countries Worldwide (in %), ISIC Rev. 2

	Australia 70-94	Austria 83-94	Barbados 76-02	Belarus 90-94	Belgium 88-92	Brazil 81-01	Bulgaria 79-91	Canada 70-97
GDP	1.39	0.93	0.26	-5.58	0.55	-0.13	2.92	0.88
Agric.	1.77	2.50	-0.34	-3.89	4.57	1.83	3.05	1.22
Industry	3.22	2.88	1.37	-4.33	0.94	-0.21	3.56	1.82
Construct.	1.04	0.58	-1.53	-5.41	-0.76	0.74	4.73	-0.05
Trade	-0.30	-0.88	0.84	-15.66	0.66	-4.37	1.96	-0.01
Transport	3.97	2.24	4.04	-11.30	2.42	0.32	2.59	2.50
Others	0.88	-0.27	0.47	-3.19	0.19	0.36	1.49	0.27
Others II	0.88	-0.39	-0.34	-3.01	0.34	0.36	1.49	0.27
	Chile 75-02	China 87-02	Colombia 85-02	Costa Rica 87-96	Cuba 95-02	Cyprus 76-95	Denmark 72-93	Domin. R. 91-96
GDP	2.28	6.61	-6.22	2.06	2.24	3.03	0.96	4.53
Agric.	4.00	3.64	-20.16	5.02	-1.49	2.29	5.44	7.45
Industry	2.80	11.77	-4.06	2.23	5.24	2.61	1.88	3.24
Construct.	-0.18	4.95	-8.16	0.38	11.55	-0.10	-0.71	3.40
Trade	2.25	1.45	-7.54	-0.28	-0.34	3.31	0.43	6.57
Transport	3.20	7.15	-6.10	2.91	6.83	1.58	0.97	5.24
Others	0.94	0.89	-3.38	0.08	1.00	3.37	0.29	1.10
Others II	1.02	-1.00 ^a	-3.39	0.09	1.00	3.17	0.33	1.09
	Ecuador 90-98	Egypt 71-95	Finland 83-95	Germany 91-94	Greece 81-92	Honduras 70-83	Hong Kong 78-03	Indonesia 76-02
GDP	-0.53	2.36	2.71	2.42	0.72	2.50	3.40	3.39
Agric.	1.01	3.56	3.78	10.72	2.96	1.18	12.35	2.35
Industry	2.60	2.73	5.55	4.14	0.30	1.83	10.12	1.53
Construct.	-0.50	1.42	0.82	-1.36	2.33	3.22	2.23	1.09
Trade	-1.20	3.86	2.01	0.30	-0.07	1.05	1.47	1.69
Transport	0.33	6.78	4.41	4.75	4.36	1.55	1.60	1.86
Others	-1.94	-1.25	0.90	0.81	-1.11	3.88	0.66	2.33
Others II	-1.96	-1.09	0.85	0.81	-1.09	3.88	0.67	2.92
	Ireland 83-91	Ireland 70-79	Israel 80-94	Italy 77-94	Jamaica 92-02	Japan 70-02	R. of Korea 71-94	Luxemb. 70-90
GDP	4.10		1.52	2.32	-0.02	2.43	4.71	2.20
Agric.	2.00	6.89	0.24	4.92	2.34	3.10	4.85	1.74
Industry	4.18	4.54	2.61	2.38	4.55	3.27	6.17	2.26
Construct.	0.33	3.11	1.31	1.67	-5.36	-0.15	2.78	1.56
Trade	3.91	5.08	-1.28	1.25	-0.96	2.06	2.40	3.86
Transport	8.04	3.38	3.08	4.49	1.61	2.35	5.35	2.01
Others	4.30	3.98	3.27	0.56	0.50	1.44	1.80	0.97
Others II	4.28	3.85	3.31	0.56	0.61	1.38	1.80	0.97
	Macau 89-97	Malaysia 82-00	Mexico 88-95	Myanmar 78-98	Netherl. 77-94	NL Antil. 91-97	New Zeal. 86-98	Nicaragua 90-01
GDP	2.09	3.12	-0.28	1.63	0.14	0.47	0.41	-0.48
Agric.		1.36	-1.69	1.59	4.71	1.92	2.05	-0.24

Industry	7.18	3.71	4.16	0.97	1.86	-0.13	1.06	0.79
Construct.	-1.45	-0.24	-1.61	6.37	1.06	2.58	-0.67	-7.02
Trade	-2.94	2.46	-3.48	0.29	-0.46	-2.20	-0.49	-0.91
Transport	3.41	4.73	-1.14	5.80	1.41	1.10	2.58	0.67
Others	-2.63	3.33	-0.05	1.40	0.12	0.14	-0.08	-2.41
Others II	-2.19	3.34	0.24	1.40	-0.19	0.14	-0.04	-0.29
	Norway 72-95	Pakistan 73-02	Panama 70-92	Paraguay 82-96	Philippines 71-2000	Poland 81-92	Portugal 74-93	Puerto Rico 70-02
GDP	2.59	2.65	1.55	-7.66	0.81	1.65	2.07	2.01
Agric.	4.62	2.56	0.89	-17.53	0.63	4.38	6.90	4.29
Industry	4.16	3.58	0.38	-6.70	1.22	0.63	1.62	4.08
Construct.	2.53	0.65	-1.51	-6.66	0.84	3.84	0.58	0.26
Trade	1.32	1.55	-0.71	-10.28	0.94	2.06	-2.17	1.35
Transport	4.03	2.55	1.82	-6.28	1.22	1.54	2.68	3.98
Others	-0.32	1.28	0.52	-5.96	-0.81	-1.92	0.37	1.31
Others II	-0.34	2.42	1.40	-5.94	-0.76	-1.84	0.39	1.31
	Romania 80-93	San Marino 78-93	Singapore 70-93	Spain 70-93	Sri Lanka 81-98	Suriname 90-99	Sweden 70-94	Trinidad & T. 88-02
GDP	-1.05	-0.79	4.07	3.17	2.30	1.03	1.63	1.30
Agric.	-0.59	3.15	5.35	7.73	0.60	-5.22	3.75	-2.26
Industry	0.30	-0.94	3.58	4.44	2.60	8.26	3.37	2.06
Construct.	2.80	-1.02	2.70	0.84	1.49	-3.18	2.69	-3.48
Trade	-0.11	-1.90	3.39	-0.76	3.53	-3.06	2.02	3.19
Transport	-1.20	0.05	7.74	2.42	1.76	4.93	3.52	-0.80
Others	3.35	-1.64	4.63	1.84	1.18	2.54	0.20	-1.66
Others II	3.35	-1.64	4.63	1.84	2.14	2.33	0.19	-1.68
	Turkey 88-99	Ukraine 99-01	Ukraine 93-00	UK 70-89	U.S. 70-02	Uruguay 92-00	Venezuela 75-02	
GDP	2.04	7.03	-3.23	1.94	1.34	1.08	-2.41	
Agric.	0.51	12.82	-4.37	1.46	2.28	1.05	0.47	
Industry	2.44	8.84	-1.52	3.50	2.62	1.39	-1.11	
Construct.	-1.27			2.58	-0.34	0.33	-5.53	
Trade	0.64	10.62	-2.62	0.78	2.19	0.83	-5.69	
Transport	3.20	10.25	-5.44	2.49	1.97	2.71	-1.99	
Others	0.21	11.64	-2.57	1.08	0.37	0.77	-2.17	
Others II	0.21	12.05	-2.57	0.93	0.03	0.77	-2.18	
	Min.	Max.	Mean	SD	CV			
GDP	-7.66	7.03	1.34	2.49	1.86			
Agric.	-20.16	12.82	2.00	5.06	2.53			
Industry	-6.70	11.77	2.57	3.00	1.17			
Construct.	-8.16	11.55	0.38	3.20	8.45			
Trade	-15.66	10.62	0.20	3.67	17.91			
Transport	-11.30	10.25	2.32	3.42	1.47			
Others	-5.96	11.64	0.63	2.40	3.82			
Others II	-5.94	12.05	0.69	2.42	3.53			

Labor productivity growth is calculated from value added (in constant 1990 prices) and employment data. The maximum time period covered in the database is from 1970 through 2003.

The employment data are from Rev. 2 (1968):

Agric.: Agriculture, hunting, forestry, fishing; ("Major division" 1)

Industry: Mining and quarrying (2); manufacturing (3); electricity, gas and water supply (4);

Construct.: Construction (5);

Trade: Wholesale and retail trade, restaurants and hotels; (6);

Transport: Transport, storage and communication (7);

Others: Financing, insurance, real estate and business services (8); community, social and personal services (9);

Others II: Others, plus “activities not adequately defined” (0).

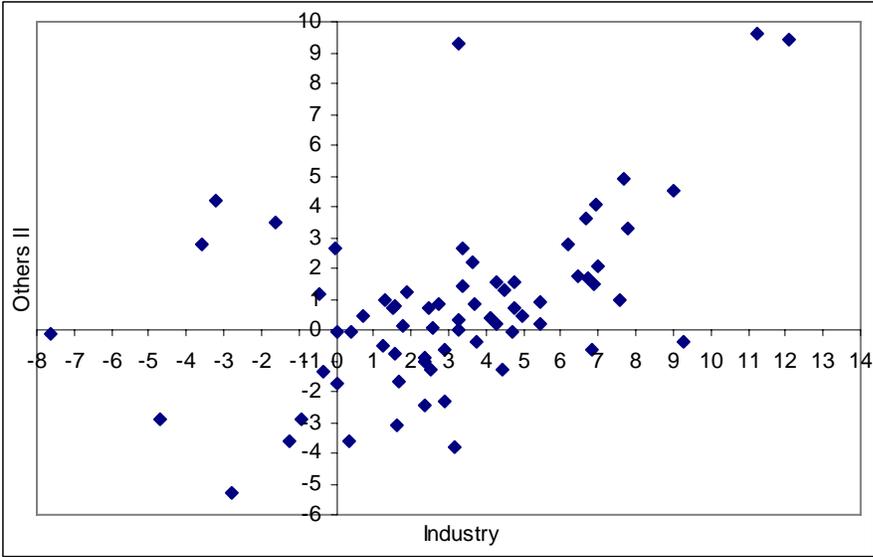
a The China data in Rev. 2 are based on value added data in the UN database which are near-identical to those in the *Statistical Yearbook* series (once adjusted to 1990 constant prices); the employment data in the ILO database are also near-identical to those in the *Statistical Yearbook* series, except for the data in the “Major Division” 9 and 10, “community, social and personal services,” and “activities not adequately defined.” The employment data in division 9 are impossible to re-constitute from the more detailed data in the *Statistical Yearbook*, and appear too small, given the value added coverage of this division, throughout; “Others,” thus, appears a gross mismatch between value added and (under-estimated) employment in this category. The employment data in division 10 are larger than the implicit residual in the *Statistical Yearbook* throughout all years. Employment in “Others II” perfectly matches all employment categories in the *Statistical Yearbook* which are not covered by divisions 1 through 7, including the implicit residual since 1990, and including geological prospecting and water conservancy, except in the years 1989-92, when there is a noticeable difference. Due to the statistical break in 1990, the labor productivity growth rate for China in “Others II” is not meaningful.

Sources:

Labor data from the International Labour Organization (<http://laborsta.ilo.org>, accessed on 10 Oct. 04), and value added data from the United Nations (<http://unstats.un.org/unsd/snaama>, accessed on 10 Oct. 04). All countries on which data in the two sources were available are included; a few countries whose data exhibit irregularities were dropped (approximately half a dozen). Labor productivity data were calculated for the maximum possible time period. For some countries, two sets of labor data were available; consequently, two sets of labor productivity growth rates are reported here.

8. Appendix on Average Annual Labor Productivity in Industry and “Other Services,” across Countries Worldwide

Figure 1 shows the relationship between average annual labor productivity growth rates in industry and in “other services” across all countries, based on Rev. 3 (with labor data from the International Labour Organization and value added from the United Nations). It is a consistent positive relationship. Countries which experience relatively high labor productivity growth in industry also do so in “other services.” Based on the experience of all countries worldwide, one would expect average annual labor productivity in “other services” in China to be around four percent.



Three data points are omitted: Azerbaijan (1999-03) with values 23.90% (industry) and 5.06 (other services); Saudi Arabia (1999-02) with 4.49% and -13.59%; Ukraine (2001-02) with 23.60% and 2.82%. The employment classification is Rev. 3.

Sources: see Table 6.

Figure 1. Average Annual Labor Productivity Growth Rates in Industry and “Other Services,” Across Countries Worldwide

9. Appendix on Harry Wu's Critique of the Official Industry Data

While Angus Maddison implicitly justifies his adoption of Harry Wu's product method with the claim that the official deflator understates inflation (p. 140), Harry Wu (2002, p. 181) presents four reasons why he thinks the official real growth rate of industry is exaggerated (the official deflator underestimated). Yet, none of his arguments can discredit the official data in comparison to his product method.

First, Harry Wu argues that the ten-year interval is long enough to introduce substitution bias (p. 181).³ But it appears that Harry Wu's calculations suffer from the same substitution bias, in that he applies year 1987 prices to product quantities in 1949 as well as in 1997. Harry Wu is not particularly concerned about the length of the time period covered in his product method, 48 years; he finds it "reasonable to argue that in a centrally planned economy the [substitution] effect might not hold because prices were controlled and consumers had few choices" (p. 192), and accepts upward biases for the years after 1987. If the substitution effect does not hold for the reform period on p. 192, then it also does not hold on p. 181.

Second, Harry Wu argues that NBS constant prices could be biased towards (low) state listed prices. But the suspected bias, with the NBS' constant price list not published, remains a hypothesis; the application of 1987 prices may be even more deficient than the official practice in that 1987 prices contained a larger share of state-determined prices than the current-year 1990 prices which the NBS is likely to have consulted when issuing its constant-price list for the 1990s.⁴

Third, Harry Wu argues that enterprises tend to report new products at current prices rather than at constant prices. This could indeed be the case; an enterprise, in the absence of an official constant price for the new product, may simply assume its current price in the first year of production to also be the constant price. There would seem little wrong with this practice, as long as the enterprise in the following years continues to use its first-year current price as constant price. Individual enterprises could well be best suited to define the constant price.⁵ (Because the price of a newly developed product for an earlier year, when it was not yet developed, cannot be

³ The substitution bias implies that if consumers, *ceteris paribus*, increase their demand in response to a price decrease, real growth rates *after* the benchmark year are likely to be over-estimates, and those *prior* to the benchmark year are likely to be under-estimates.

⁴ The exact argument with regards to the official underestimation of inflation is unclear to me. Harry Wu only offers: "Secondly, as some researchers (Maddison, 1998) believe, there could also be some coverage biases towards (low) state listed prices and insufficient coverage of the (high) prices of other market-oriented transactions." (p. 181) Perhaps the point is that some products are given a lower weight (state listed prices rather than presumably higher, actually occurring market prices); an argument similar to the substitution bias then runs that these actually high-price products, which are likely to experience low growth due to their high price, are given too low a weight (because state listed rather than market prices are used). Key would be that the products are actually traded on the market, at higher than state listed prices. Otherwise, market prices are hypothetical, and to correct value added by switching to hypothetical prices opens up a completely different chapter; Harry Wu, himself, in using the product method, uses official prices.

⁵ Even if the constant price of a new product for which no official base year price exists were to be set equal to each year's current price, the direction of the bias would be ambiguous (compared to the base year, prices could have risen or fallen). It may also be the case that the NBS issues additional base year prices over time.

estimated, ideally, the base year is changed frequently, rather than maintained for a 48-year period.)

Fourth, Harry Wu argues that small, non-state enterprises, especially at or below the village level, tend to report the same figures at both “constant prices” and current prices for convenience or out of ignorance. But, in my understanding, the NBS does not collect product quantity data from these enterprises and does not use any such data in the calculation of its deflator for industrial value added. Harry Wu refers to his interviews in pointing out mis-reporting of current prices as constant prices at the village level and below. While some small enterprises may be substituting current for constant prices when reporting to the village accountant, or to the one (if any at all) township-level statistical staff, or, most unlikely, directly to the county statistical bureau, my understanding is that the NBS in the calculation of GDP then does not make use of these specific data. My conjecture would be that these are local report forms, with the data possibly for local government use. Such reporting is not part of the NBS data collection process (NBS Industry and Communication Division, 1999, p.4).⁶

Reference specific to this appendix

NBS Industry and Communication Division. *Xinbian gongye tongji gongzuo zhinan* (New guide to industrial statistics). Beijing: Zhongguo tongji chubanshe, 1999.

⁶ It is not unusual for the NBS to ignore local data. For example, the sum of provincial-level GDP data in China is greater than nationwide GDP; the NBS derives nationwide GDP through its own calculations. (Also see Carsten Holz 2002, 2003.)

10. Appendix on Some Details Regarding Harry Wu's Product Method Calculations

“Western style” vs. “Chinese style” industry

Harry Wu reports that “163 items are finally selected and 161 items are used in constructing the physical output index for the industrial sector” (p. 186). “There are 83 CIOT industries in the (Chinese style) industrial sector of the 1987 input-output table. After removing logging and maintenance of machinery that should not be included in the industrial sector by international standard, 81 CIOT industries should be included in the industrial sector as the standard classification.” (p. 187)

His “western style” total industry, in contrast to the official Chinese data on industry, thus, appears to exclude the “logging and transport of timber and bamboo” sector (label from *Statistical Yearbook 1996*, p. 424) for which he has quantity data on the two “items” logs and bamboo (presented under the label “forestry”), and the maintenance sector for which he presents no data. Harry Wu provides no 1987 constant price time series output values for logs and bamboo, two industries which in 1987 were of about equal size in terms of value added.

For logging, his price and quantity data on the only relevant two products, logs and bamboo, suggest an average annual growth rate of 1.78% between 1978 and 1995 (Appendix Table A1, p. 198). He does not provide any data on maintenance; I would expect growth rates in maintenance to match the average across industry. In an extreme case scenario of no growth in the missing two sectors, the following calculation can be made: the 9.85% growth rate in “western style” total industry weighted by 1987 value added in “western style” total industry combined with a 0% growth rate in logging and maintenance weighted by the corresponding 1987 value added of these two categories yields an overall growth rate of “Chinese style” industry of 9.60% (for the nominal 1987 value added weights see Harry Wu's Table 1, p. 188).

Angus Maddison's industry growth rate based on Harry Wu's earlier calculations is quite possibly based on “western style” total industry—Harry Wu's working paper is not available to me. Angus Maddison's value added of agriculture, apart from his own calculations for farming, includes the official forestry value added—within the agricultural sector—provided by the NBS. The industrial sector logging (as well as maintenance) seems to have gone missing when it comes to industrial growth rates in Angus Maddison's calculations.

Product coverage

In 1987, product quantity data combined with the largely imputed prices yield an aggregate gross output value equal to 57% of official gross output value of industry, and if those products for which no price data are available contributed to industrial value added equally as those for which price data are available, 62% (Harry Wu, 2002, pp. 187 and 189). But 1987 appears an exceptional year. Harry Wu in his Appendix Table A1 (pp. 195ff.) reports quantity data product by product for the years 1952, 1978, 1987, and 1997, as well as price data for 1987. For many products, no 1952 data are available, and for a few products no 1978 or 1997 data are available. While he offers explanations with some products on how data gaps are bridged, it seems that for other products he was not able to bridge the gap.

The aggregate constant 1987 price total industrial value added for the individual years before and after 1987 (data which he reports in his Appendix Table A.2) is the sum of sectoral value added, where sectoral value added is based on 1987 value added times the quantity index. It appears that the (sectoral) quantity indices in the years before and after 1987 make use of fewer products than the 57% or 62% figure for 1987 suggests. The sectoral weights of 1987 appear to be applied to all years, whether it is 1952 or 1997. These 1987 sectoral weights are applied in other years to sectoral quantity indices which could be very fragile (based on very few quantity data).

Translating gross output value into value added

Lacking other data, Harry Wu is forced to assume constant 1987 *sectoral* ratios of value added to gross output value when he translates his product-derived sectoral gross output value indices into value added. In the case of the directly reporting industrial enterprises (which accounted for 63.42% of industrial value added in 1995; *Statistical Yearbook 1995*, pp. 42, 411), the *aggregate* ratio of value added to gross output value fell from 0.323549 in 1993 to 0.290189 in 1997 (the two years furthest apart for which comparable data are available), which implies a 2.76% average annual decline (*Statistical Yearbook 1994*, p. 378; *1998*, pp. 55, 444) which is not incorporated in Harry Wu's data, and would *lower* his industrial real growth rate.

Similarly, official industry-wide data show a fall in the ratio of value added to gross output value from 0.379278 in 1978 to 0.265019 in 1995 (*Statistical Yearbook 1996*, pp. 42, 403), which implies a 2.09% average annual decline. Harry Wu, based on input-output tables for 1987 and 1992, reports a fall from 0.344 to 0.283, attributes it to increasing waste, and conjectures that "this decline might have stopped after the early 1990s along with China's intensified marketization" (p. 193). A different argument would be that in as far as Harry Wu's calculations cover traditional products produced in well-established enterprises, the ratio of gross output to value added in the case of these products could be constant.

Special data sources for five products

Harry Wu revises downward the most recent product quantities in the case of five products: semi-conductors, integrated circuits, metallurgical equipment, petroleum-petrochemical equipment, and transformers (p. 186). The reason given is that in the "policy-driven expansion period 1993-95 ... many ... items [in his regular, main source for quantity data] appeared to experience an extraordinarily fast growth." He then uses alternative data sources where he finds lower quantity data for this period. In the case of semi-conductors, his footnote 13 reports 16,702 million units in 1994 and 17,735 million units in 1995 in the main source for quantity data, compared to 10,458 and 12,386 million units in an alternative source, which also provides capacity data of 12,391 and 16,979. Harry Wu says that he used the alternative data source; his final table with the data used in his calculations reports a 1997 value of 12,550. (This table, Appendix Table A1, pp. 195ff., only reports quantity data for 1952, 1978, 1987, and 1997.) A potential issue is that all five corrections imply a lower overall growth rate, i.e., *favor* his hypothesis.

Harry Wu's product quantity index as a simplification of the official procedure for deriving industrial value added

HW's product quantity index method appears to be a simplified form of the official method of determining real growth of industry. The latter relies on a number of products in the thousands (rather than 161, as Harry Wu) and on linked, approximately decennial base year prices (rather than 1987 prices only). In the calculation of the official real growth rate of industry, more of the value calculations (quantity times fixed prices) occur within enterprises, which Harry Wu suspects of over-reporting of values but not of quantities.

11. Appendix on the Cross-country Product Method

For each country, all data for 1978 and 1997 were copied from the original database (the United Nations Industry Commodity Production Statistics Database) into an Excel file. The following steps were taken to prepare the data for use.

- (i) Deletion of all products for which data are only available for one of the two years (1978 or 1997).
- (ii) Deletion of products that are measured in different ways in the two years (for example, products which are measured in tons in one year but in square meters in the other year).
- (iii) Adjustment of the data of variables measured in thousands in one year but in millions in the other (or in liters in one year and in hectoliters in the other year, etc.).
- (iv) When products in the two years are measured in two different ways, for example, in tons and in square meters, one measure (the measure I deem less meaningful) is deleted.
- (v) When product data are provided in both years with full and limited coverage, the limited coverage data is deleted. (For example, for some products data are available for “total production” and for “industrial production;” the data on “industrial production” is deleted.)
- (vi) Data on higher-level categories are deleted when data on all sub-categories are available. (For example, “Television receivers (total production)” is deleted because data on the production of black and white television receivers and on the production of color television receivers, the two exhaustive subcategories, are available separately.)
- (vii) When two sets of data are available for one and the same product at a different processing stage, both sets of data are retained; such instances are rare. (One example is soy bean oil, in crude vs. refined form.)

12. Appendix on Tertiary Sector Census Revisions to Chinese GDP Data

The tertiary sector census of 1993 led to a retrospective revision of tertiary sector value added of all earlier years since 1978 (and thereby also of GDP). Table 7 shows the revisions. Tertiary sector value added of the most recent year, the year of the revision, 1993, was revised upward by 32.04%. The subsector with the largest revisions was commerce, with an upward revision in 1993 of 73.40%. “Other services” were revised upward by 24.75%. Angus Maddison’s data already incorporate all these revisions. In particular, they *already incorporate* the retrospective upward revision of “other services” in 1987 of 13.21%. The NBS offers no explanation on the sources of these revisions. It is, thus, not clear whether undervaluation was replaced by proper valuation, or previously unvalued services became newly valued in 1993. What the retrospectively revised data can offer is a rough idea of the potential margin of error in the value added of “other services.” That margin of error is well below Angus Maddison’s upward adjustments.

Table 7. Upward Revisions in GDP Data Following Tertiary Sector Census, in %

	GDP	Tertiary sector			
		Total	Transport, post and telecommunications	Wholesale and retail trade, catering	Other services
1978	1.00	4.37	0.00	0.00	9.32
1979	1.00	4.86	0.00	0.00	9.52
1980	1.07	5.20	0.00	0.00	9.56
1981	1.83	8.96	0.00	12.20	11.12
1982	2.17	10.83	0.00	24.44	11.44
1983	2.55	12.50	0.00	35.32	11.71
1984	3.50	15.90	0.00	44.65	12.63
1985	5.12	20.62	0.00	52.24	11.94
1986	5.31	21.17	0.00	58.10	12.36
1987	5.80	22.99	0.00	62.32	13.21
1988	6.07	23.36	0.00	65.10	10.72
1989	5.70	20.30	0.00	66.70	8.78
1990	4.80	17.17	2.68	67.56	8.49
1991	7.08	24.66	10.39	67.56	13.90
1992	9.33	33.11	9.50	88.71	21.68
1993	9.99	32.04	11.69	73.40	24.75
% share in revised GDP					
1993		31.79	5.97	9.00	16.83
1987		29.33	4.56	9.70	15.07

Xu Xianchun (2000a, pp. 96f.) provides a similar, but less complete table. He labels the category “other services,” here obtained as a residual, “non-material services.”

A double-check for the primary and secondary sectors reveals that no revisions have taken place following the tertiary sector census, except a very small revision for 1993, the most recent year, which presumably reflects a standard revision in the second year after the first publication of the 1993 data.

Sources:

Pre-revision data: *Statistical Yearbook 93*, pp. 31f., and *1994*, p. 32. (The latter edition is the main source.

It is lacking data for 1979, 1981, and 1982, which are taken from the earlier source; the data for 1978, 1980, 1983, and 1984 were checked as to if they are identical in both sources, and they are.)

Post-revision data: *Statistical Yearbook 95*, p. 32, and *2002*, p. 51. (The earlier edition is the main source.

It is lacking data for 1979 and 1981-83, which are taken from the later source; the data for 1978, 1980, and 1984 were checked as to if they are identical in both sources, and they are.)

13. Appendix on Grain Pricing

Total output of grain in China in 1987 was 404.73m tons (*Statistical Yearbook 1988*, p. 248). According to household survey data, the rural population (*nongmin*) in 1987 consumed 259kg of grain per capita, while the urban (*chengzhen*) population consumed 66.92 kg of grain per capita (*Statistical Yearbook 1988*, pp. 807, 825).

The rural (*xiangcun*) population in 1987 was 577.11m, and the urban (*shizhen*) population 503.62m (*Statistical Yearbook 1987*, p. 97); on the other hand, using the population data implicit in the aggregate GDP consumption data combined with the per capita GDP consumption data, the “agricultural” (*nongcun*) population in 1987 was 870.53m, and the “non-agricultural” (*chengzhen*) population 214.06m (*Statistical Yearbook 1998*, pp. 68, 72, with these specific English and Chinese labels).

Urban grain consumption in 1987, thus, amounted to 33.70m kg or 14.32m kg, 8.33% or 3.54% of total grain production, depending on the source of the population data. Rural grain consumption in 1987 amounted to 149.47m kg or 225.47m kg, 36.93% or 55.71% of total grain production.

Angus Maddison in Table A.17, p. 114, has data for 1994 which show that 19.95% of cereals output is destined for use as feed, while 2.70% of cereals output is destined for use as seed. He does not provide the necessary such summary data for 1987, and it is quite possible that farmers in 1987 were even more self-reliant for feed and seeds than in 1994.

Assuming that all grain consumed by the urban population is traded, but that grain consumed by the agricultural population is not, and assuming that all grain destined for use as feed or seed are not traded, implies that 59.58% (36.93% + 19.95% + 2.70%) or 78.36% (55.71% + 19.95% + 2.70%) of total grain production in 1987 were not traded. I.e., quota, above-quota, and market prices were only relevant for the residual of 20-40% of total grain produced. (The residual, grain consumed by the urban population, and grain which serves as intermediate input in other economic sectors, is assumed traded.) The residual is even smaller if wastage and loss are considered.

14. Appendix on Land Measurement

Localities intent on limiting the amount of agricultural taxes they have to pass on to the center have been underreporting the land area in agricultural use. The magazine *Caijing*, no. 122 (13 Dec. 2004), pp. 84f., provides the following data: the total agricultural area used for the calculation of agricultural taxes in 2003 was 1.26b mu; the statistics of the Ministry of Agriculture, based on the second round of contracting of fields (*gengdi*) report 1.425b mu; and the State Land and Resource Ministry reports 1.851b mu of fields (*gengdi*) in 2003.

The *Statistical Yearbook 2004*, p. 5 or p. 475, reports 130.04m ha of fields (*gengdi mianji*) for 2003, which, with 1 mu equal to 0.0667 ha, implies a field area of 1.9496b mu. If this were the aggregate of the field area measures used by the statistical bureaucracy when calculating the output of farm products (as output of a particular product per sample area times total area of the particular product), then the resulting output quantities of farm products in 2003 would be overestimates. The same need not be true for 1987, but the 2003 values indicate the degree of uncertainty surrounding agricultural quantity output values.

15. Appendix on the PWT Manipulations for 1996-99

Alan Heston (2001), p. 4, for each of the years 1990 through 1999 lists two sets of ratios, the average propensity to consume based on official expenditure approach GDP data, and the average propensity to consume based on household survey data. The first is private consumption divided by the sum of private consumption, investment, and government expenditures, all based on official data. The second set is labeled “APC Zhang-Rawski.” Thomas Rawski kindly furnished as the reference Zhang Ping (2000), the data in which, when counter-checked against various data in the *Statistical Yearbook*, turn out to be household survey data.

Alan Heston appears to use an unweighted mean between the in Zhang Ping separately listed urban and rural ratio of household survey consumption to household survey disposable income, except in 1994 and 1996 when Alan Heston’s data differ slightly from the unweighted mean. While he includes 1999 data in his APC Zhang-Rawski column, Zhang Ping’s data end in 1998. He ignores that consumption and income data in the urban vs. rural case have different coverage.

The correction procedure is to divide the first set of ratios by the second set, take the average of this new double-ratio of the years 1990 through 1995, and divide the double-ratios of the years 1996 through 1999 by this average double-ratio. This yields a correction factor which is then applied to official private consumption. My interpretation of this procedure is that the increasing discrepancy between the official average propensity to consume and the household survey average propensity to consume are taken as a sign of official data falsification of consumption in the national income accounts. The in the latter half of the 1990s slightly increasing relative difference in the official and the household survey average propensity to consume (standardized by the household survey average propensity to consume), in as far as it exceeds the average 1990-95 relative difference, is then used to adjust official private consumption downwards.

With four variables involved in the calculation, namely official consumption, official income, official household survey consumption, and official household survey income, some assumption such as “official consumption is wrong, all other official data are correct,” is required for the correction procedure to make sense. But, in this case, if official consumption is incorrect, then so is official income; maybe, then, the ratio again is correct? It seems that to justify the revisions to official data, very particular assumptions are needed about each variable as well as their relative accuracy.

Reference specific to this appendix

Zhang, Ping. “Shouru cha’yi, lilu he xiaofei” (Income differentials, interest rate, and consumption). *Caimao jingji*, no. 8 (2000): 16-22.

16. Appendix on the Deflator for Consumption in China

Use of the official CPI (or something resembling it) to deflate the consumption component of expenditure approach GDP, as is done in the PWT, is problematic. The weights used in the CPI for aggregating the various sub-indices are based on household expenditure surveys. Household expenditure surveys, however, do not properly reflect household consumption as relevant for the expenditure approach to the calculation of GDP. First, household expenditures (in the surveys), and thus the CPI, contain such non-consumption items as building materials for houses (investment) and maintenance expenditures for houses. Second, per capita expenditures for consumption (including housing investment/ maintenance) in the household surveys fall far short of per capita consumption in the national income accounts. In 2000, urban per capita household expenditures for consumption exceeded urban per capita consumption in the national income accounts by 48 %; in the rural case the percentage is 26%.⁷ It need not be the case that the extra consumption in the calculation of expenditure approach is structured identically to that underlying the CPI calculation.

These discrepancies compare favorably to the case of the U.S., where consumption in the national income accounts in 2002 was 53% higher than in the household surveys.⁸ Presumably this is the reason why the Bureau of Economic Analysis does not simply rely on the CPI to deflate consumption in the expenditure approach to the calculation of GDP.

With 1978 as the base (100), the deflator for personal consumption in the expenditure approach to GDP in the U.S. was 211.8 in 1995 (221.9 in 1998), while the (in the U.S., only urban) CPI for all items was 233.7 in 1995 (250.0 in 1998).⁹ With approximately 80% of the U.S. population living in urban areas, the (non-existent) U.S. rural CPI would have had to be 124.2 in 1995, up from 100 in 1978, for the urban and rural CPI to yield the U.S. consumption deflator in the expenditure approach to GDP; a rural CPI of 124.2 in 1995, in the face of an urban CPI of 233.7, is not credible (too low). Consequently, the U.S. pattern is the same as in China, with the CPI higher than the implicit deflator of personal consumption in expenditure approach GDP.

⁷ In 2000, in urban areas, per capita household expenditures for consumption of 4998.00 yuan RMB compared to urban per capita consumption in the national income accounts of 7402 yuan RMB. In the rural case, the two data points are 1834.31 yuan RMB and 2037 yuan RMB. For the per capita consumption data in the national income accounts see *Statistical Yearbook 2003*, p. 72, and for the household survey expenditure data pp. 345 and 372 in the same issue. A CPI breakdown is on pp. 314ff.

⁸ For aggregate household consumption in the U.S. national income and product accounts see the relevant tables available at the BEA website (<http://www.bea.doc.gov/>), for population data (to obtain per capita values) the relevant tables at the U.S. Census Bureau website (<http://www.census.gov>), and for household survey data the Bureau of Labor Statistics' <ftp://ftp.bls.gov/pub/news.release/cesan.txt> (accessed on 26 Feb. 2004).

⁹ The data are from the Bureau of Economic Analysis and the Bureau of Labor Statistics, at <http://www.bea.doc.gov> and from <http://www.bls.gov/cpi/home.htm>, accessed on 17 Nov. 04.